

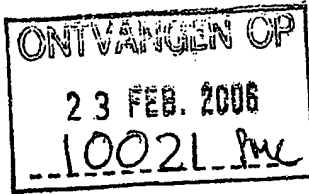
PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

CLARKSON, Paul Magnus
Rembrandt Tower- 31st Floor
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PAYS-BAS



NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing
(day/month/year)

24.02.2006

Applicant's or agent's file reference
05589.0003.00PC00

IMPORTANT NOTIFICATION

International application No.
PCT/EP2004/011833

International filing date (day/month/year)
18.10.2004

Priority date (day/month/year)
17.10.2003

Applicant
OXYCELL HOLDING BV et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:



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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

| | | | | |
|---|--|---|--|--|
| Applicant's or agent's file reference 05589.0003.00PC00 | | FOR FURTHER ACTION | | See Form PCT/PEA416 |
| International application No. PCT/EP2004/011833 | | International filing date (day/month/year) 18.10.2004 | | Priority date (day/month/year) 17.10.2003 |
| International Patent Classification (IPC) or national classification and IPC F24F5/00, F28D5/00 | | | | |
| Applicant OXYCELL HOLDING BV et al | | | | |
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> | | | | |
| <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p> | | | | |
| Date of submission of the demand 17.08.2005 | | Date of completion of this report 24.02.2006 | | |
| Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016 | | Authorized Officer De Graaf, J.D. Telephone No. +31 70 340-3914 | | |

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**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/011833

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-19 as originally filed

Claims, Numbers

1-19 filed with the demand

Drawings, Sheets

1/5-5/5 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☒ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☒ the claims, Nos. 20-26
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/011833

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|------|
| Novelty (N) | Yes: Claims | 1-19 |
| | No: Claims | |
| Inventive step (IS) | Yes: Claims | 1-19 |
| | No: Claims | |
| Industrial applicability (IA) | Yes: Claims | 1-19 |
| | No: Claims | |

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and /or

2. Non-written disclosures (Rule 70.9)

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1) Reference is made to the following document:

D1: US-B1-6 338 258 (LEE DAE YOUNG ET AL) 15 January 2002 (2002-01-15)

2) The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

A dew point cooler (2) comprising a heat exchange element (36,34), the dew point cooler operating in a counterflow wherein a product air stream flows over a first side of the heat exchange element (dry channel 31) and is cooled by heat transfer to the element (36,34) and wherein a portion of the product air stream is diverted back over a second side of the heat exchanger element (wet channel 33), the second side of the heat exchange element being provided with a supply of water (8) whereby heat transfer from the heat exchange element (36,34) to the water causes it to evaporate into the air stream, where the heat exchange element (34) comprises a membrane (36) and a formed heat exchange part (34) attached to the membrane (36).

The subject-matter of claim 1 differs from this known dew point cooler in that the formed heat exchange part is made of a laminate comprising a formable carrier layer at least partially covered with a flexible liquid retaining layer having an open structure such that in use, a heat exchange medium can directly contact the carrier layer through the open structure of the liquid retaining layer.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as to improve the design of dew point coolers with respect to the production process. By using a formable laminate covered with a flexible liquid retaining layer as a basis for the formed heat exchange part, the heat exchange part can be attached to the membrane directly after forming (e.g. in a mould) has taken place, without an additional step of applying a liquid retaining layer.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: None of the available prior art documents suggest the use of such a laminate for the heat exchange part, to be attached to a heat conducting membrane, in the wet side part of a dew point cooler.

Claims 2-15 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

3) Method claim 16, is not clear (in particular the meaning of "a membrane" and the relation of the membrane to the dew point cooler (Art. 6 PCT)) and has been considered as follows (underlined, in bold an addition added by examiner):

A method of manufacturing a dew point cooler **according to claim 1**, comprising:
providing a heat exchange laminate comprising a formable layer at least partially covered with a flexible liquid retaining layer having an open structure;
forming the laminate into a plurality of elongate fins; and
attaching the fins to a first surface of a membrane for heat transfer thereto to form a heat exchange element.

Document D1 shows a dew point cooler provided with a plurality of formed elongate heat exchange fins, attached to a first surface of a membrane for heat transfer thereto to form a heat exchange element.

The subject-matter of claim 16 differs from this known dew point cooler in that the heat exchange fins are made of a formed laminate comprising a formable carrier layer at least partially covered with a flexible liquid retaining layer having an open structure, the manufacturing method further comprising the step of forming the laminate into a plurality of elongate fins.

The subject-matter of claim 16 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as to improve the manufacturing process of dew point coolers. By using a formable laminate covered with a flexible liquid retaining layer as a basis for the formed heat exchange part, the heat

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/EP2004/011833

exchange part can be attached to the membrane directly after forming (e.g. in a mould) has taken place, without an additional step of applying a liquid retaining layer.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: None of the available prior art documents suggest a manufacturing step of forming a laminate into a plurality of elongate fins (to be attached to a heat conducting membrane, in the wet side part of a dew point cooler).

Claims 17-19 are dependent on claim 16 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VI

Certain documents cited

Certain published documents

| Application No Patent No | Publication date (day/month/year) | Filing date (day/month/year) | Priority date (valid claim) (day/month/year) |
|-----------------------------|--------------------------------------|---------------------------------|---|
| WO2004/040219 | 13-05-2004 | 31-10-2003 | 31-10-2002 |
| WO2005/019739 | 03-03-2005 | 20-08-2004 | 20-08-2003 |

17. 08. 2005

(54)

CLAIMS

1. A dew-point cooler comprising a heat exchange element, the dew-point cooler operating in counter flow wherein a product air stream flows over a first side of the heat exchange element and is cooled by heat transfer to the element and wherein a portion of the product air stream is diverted back over a second side of the heat exchange element, the second side of the heat exchange element being provided with a supply of water whereby heat transfer from the heat exchange element to the water causes it to evaporate into the air stream, wherein the heat exchange element comprises a membrane and a formed heat exchange laminate attached to the membrane, the formed heat exchange laminate comprising a formable carrier layer at least partially covered with a flexible liquid retaining layer having an open structure such that in use, a heat exchange medium can directly contact the carrier layer through the open structure of the liquid retaining layer.
2. The dew-point cooler according to claim 1, wherein the liquid retaining layer is a fibrous material and the open structure comprises spaces between the fibres.
3. The dew-point cooler according to claim 2, wherein the fibrous material is adhered to the carrier layer by an adhesive.
4. The dew-point cooler according to claim 3, wherein the fibrous material comprises a bonded mixture of polyester and viscose fibres.
5. The dew-point cooler according to claim 3, wherein the fibrous material comprises a woven or knitted fibrous layer.
6. The dew-point cooler according to any preceding claim wherein the carrier layer comprises aluminium.
7. The dew-point cooler according to any preceding claim wherein the liquid retaining layer has an average thickness of less than 50 microns.

8. The dew-point cooler according to any preceding claim, wherein the heat exchange laminate is corrugated to form a series of elongate fins.
9. The dew-point cooler according to claim 8 wherein the elongate fins are wave shaped in their elongate direction.
- 5 10. The dew-point cooler according to any preceding claim , wherein the fins are provided with louvres.
11. The dew-point cooler according to any preceding claim, wherein the liquid retaining layer is provided substantially only on a first side of the carrier layer.
12. The dew-point cooler according to any preceding claim wherein the formed heat
10 exchange laminate is attached to the membrane by adhesive.
13. The dew-point cooler according to claim 12 wherein the adhesive is a heat actuated adhesive applied to the carrier layer or the membrane.
14. The dew-point cooler according to any any preceding claim wherein the membrane is formed into a tubular structure.
- 15 15. The dew-point cooler according to any preceding claim, wherein the membrane also comprises a heat exchange laminate according to any of claims 1 to 7
16. A method of manufacturing a dew-point cooler comprising:
 - providing a heat exchange laminate comprising a formable carrier layer at least partially covered with a flexible liquid retaining layer having an open structure;
 - 20 forming the laminate into a plurality of elongate fins; and
 - attaching the fins to a first surface of a membrane for heat transfer thereto to form a heat exchange element.
17. The method according to claim 16 further comprising forming louvres in the fins.
18. The method according to claim 16 further comprising attaching further fins to a
25 second surface of the membrane for heat transfer thereto.

19. The method according to claim 18 further comprising folding the membrane to form a tubular structure with the elongate fins on an exterior surface of the tubular structure and the further fins on an internal surface of the tubular structure.